Lateral inhibition

Truth 3:

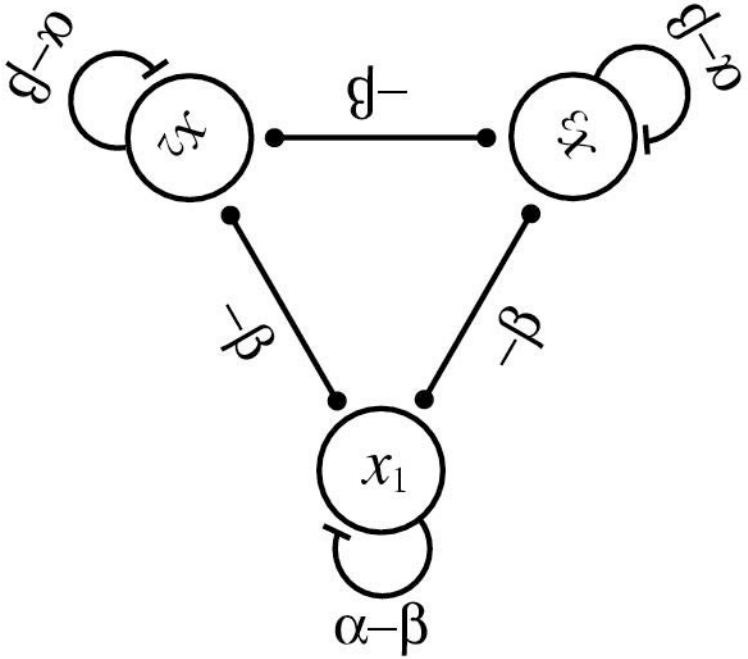
Lateral inhibition can create differences even where none exist.

Decisionmaking

- Suppose that alternatives are graded on a single scale.
- Make decision by choosing the best.
- Could require amplification of small differences.
- Could require infinite amplification.

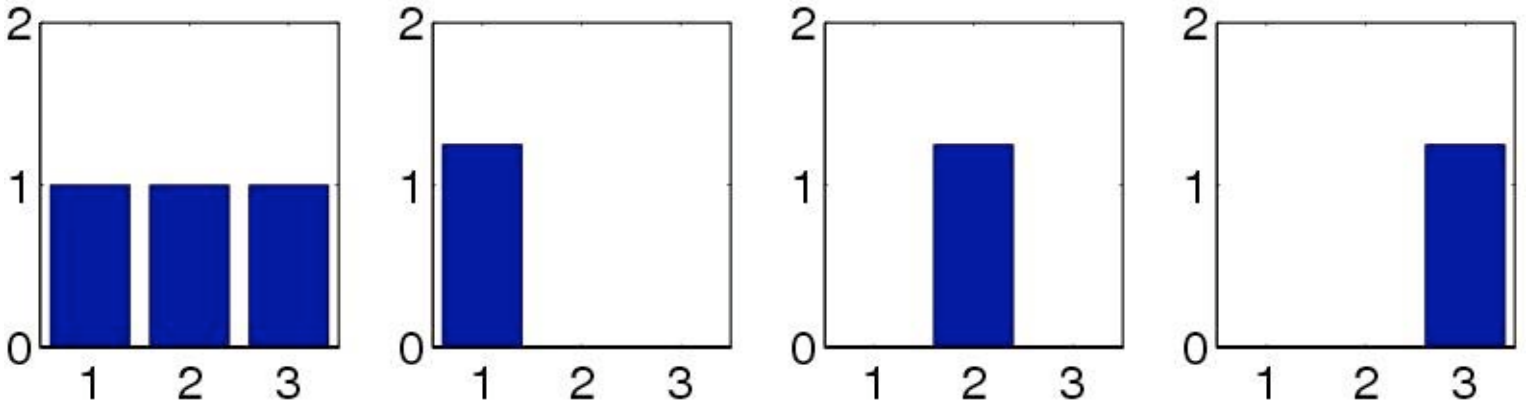
All-to-all inhibition

$$\dot{x}_i + x_i = \left[b_i + \alpha x_i - \beta \sum_j x_j \right]^+$$



Consider α>1.

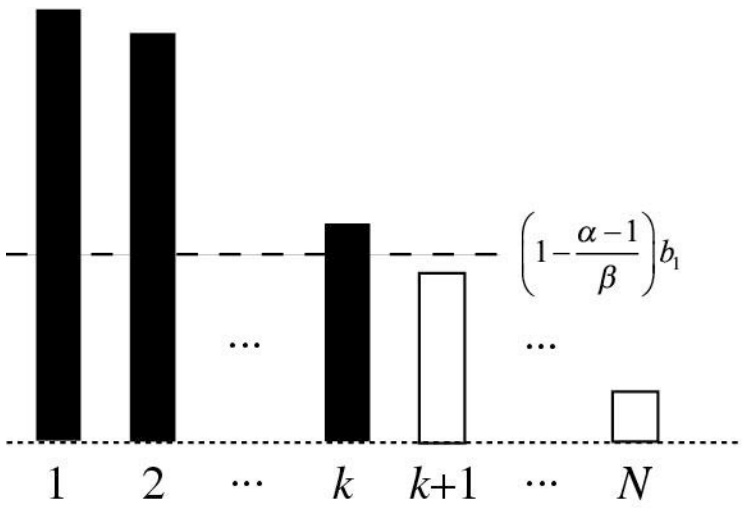
Unconditional winner-take-all



Differential modes are unstable

$$\begin{pmatrix} \alpha-\beta & -\beta & -\beta & \dots & -\beta \\ -\beta & \alpha-\beta & -\beta & \dots & -\beta \\ -\beta & -\beta & \alpha-\beta & \ddots & \vdots \\ \vdots & \vdots & \ddots & \ddots & -\beta \\ -\beta & -\beta & \dots & -\beta & \alpha-\beta \end{pmatrix}$$

Conditional multistability



$$x_i = \frac{b_i}{1-\alpha+\beta}$$

$$\frac{b_1 - b_i}{b_1} < \frac{\alpha - 1}{\beta}$$

One possible winner

$$\frac{b_1 - b_2}{b_1} \geq \frac{\alpha - 1}{\beta}$$

Any neuron can win

$$\frac{b_1 - b_N}{b_1} < \frac{\alpha - 1}{\beta}$$

Multistability